

## Description

# Apparatus to control gas burner for stir-fry cooking

### BACKGROUND OF INVENTION

#### [0001] 1. FIELD OF THE INVENTION

[0002] The present invention relates generally to an apparatus that features a mechanism for controlling gas burner, either by knee or by hand, to achieve a desirable timing and volume of heat during the process of Chinese stir-fry cooking.

#### [0003] 2. DESCRIPTION OF THE PRIOR ART

[0004] Gas valve switch structure are widely used in homes and restaurants to provide control over gas appliances. Commonly, the valves to open and allow gas to flow to the gas burners are controlled manually by hand.

[0005] However, the conventional gas valve switch is not convenient for Chinese cooking, particularly, for making stir-fry dishes in kitchens of Chinese restaurants. Chinese stir-fry

cooking is a unique way of cooking that requires the dish ingredients to be placed in hot oil over intense heat with rapid tossing and short cooking time. Generally, stir-fry cooking is a "two hands" work performed by a Chinese chef, who uses one hand to toss a wok, while using another hand to hold a frying accessory such as a spoon to assist. It is evident that, during stir-fry cooking, it is inconvenient and difficult for a chef to switch on/off the gas burner every time when a dish is prepared, especially during his busy time. However, a chef has to do so since it is not a good idea to heat an empty wok on such intensive heat.

[0006] In addition, the traditional gas valve switch structure used in Chinese stir-fry cooking gas burner has the following disadvantages: due to the inconvenience in turning off the gas immediately after stir-fry cooking, the resulting gas burning and exposed flame with extremely high temperature and heavy smokes cause a unpleasant and unsafe working environment. It is also the major factor for grease accumulation on hood and resulting in the hood damages sometimes.

[0007] Some efforts have been made for automatic stir-fry machines. Examples can be found in the prior arts, such as

US Patent 6,647,864 and 4,503,502. US Patent 6,647,864 uses the gas burner control and safety system, which include automatic gas valve unit, automatic gas shut-off device, and cooking chamber temperature sensor units.

However, these findings and derived systems are often too complicated to be used in the restaurants for practical stir-fry cooking uses and the cost for building an automatic stir-fry machine is usually high.

[0008] To address the above problems and drawbacks, the current invention introduces an apparatus, operated either automatically through magnets or manually by hand, to replace the hand-operating-only gas valve switch currently used in the commercial products, to achieve the required gas control for burners used in stir-fry cooking.

#### **SUMMARY OF INVENTION**

[0009] The primary objective of the present invention is to provide an apparatus and a mechanism for controlling gas burner used for stir-fry cooking.

[0010] It is yet another objective of the present invention to provide an apparatus for controlling the gas burner, which could be operated either by knee or by hand.

[0011] It is a further objective of the present invention to provide an apparatus for controlling the gas burner, which can be

adjustably mounted for operator's convenience and comfort.

[0012] To achieve the above objectives, the present invention discloses an apparatus, comprising a magnetic band, a sensor board, a relay, an electromagnetic valve, a hand control handle and a circuit box. Using this apparatus, one can control gas supply either manually or automatically through a magnetic object.

[0013] A preferred sample embodiment is disclosed. For its simplicity in structure and ease in fabrication, the invented apparatus for controlling gas burner used for stir-fry cooking provides substantial benefits over current commercial gas burner control systems which are operated only by hands. The invented apparatus is potentially useful at restaurants, especially Chinese restaurants, where stir-fry dishes are served frequently.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0014] The detailed description, not intended to limit the present invention solely thereto, will best be understood in conjunction with the accompanying drawings, where similar elements will be represented by the same reference symbol, in which:

[0015] FIG. 1A shows a cooking bench on which two of the pre-

ferred embodiments of the present invented apparatus are installed.

[0016] FIG.1B shows exterior of the valve box of the present invented apparatus.

[0017] FIG. 2 is a perspective assembly view of the valve box of the present invented apparatus as shown in FIG. 1B.

[0018] FIG. 3 illustrates structure of the said valve box of the disclosed apparatus and demonstrate its working principle. FIG. 3A shows both the electromagnetic valve and the hand control valve in close state; FIG. 3B shows the electromagnetic valve in open state; FIG. 3C shows the hand control valve in open state.

[0019] FIG. 4 is a perspective assembly view of the electromagnetic control unit as shown in FIG. 2;

[0020] FIG. 5 is a perspective assembly view of the hand control unit as shown in FIG. 2;

[0021] FIG. 6A shows an electrical circuit diagram used in the magnetic control unit of the disclosed apparatus;

[0022] FIG.6B shows a sensor board;

[0023] FIG.6C shows a magnet band.

## **DETAILED DESCRIPTION**

[0024] Although specific embodiments of the present invention

will now be described with reference to the drawings, it should be understood that such embodiments are by way of example only and merely illustrative of but a small number of the many possible specific embodiments which can represent applications of the principles of the present invention. Various changes and modifications obvious to one skilled in the art to which the present invention pertains are deemed to be within the spirit, scope and contemplation of the present invention as further defined in the appended claims.

[0025] Described in general, the present invention is an gas control apparatus, which can be operated either manually or automatically through magnets. When a person wearing a magnetic band stands close to the sensor board, the electromagnetic valve will open to allow gas pass through to a gas burner. When the person moves the magnetic band away from the sensor board, the electromagnetic valve will shut down to block gas supply.

[0026] Referring to FIG. 1A, there is shown installation of the apparatus on a cooking bench and demonstration on how the apparatus is connected with a gas burner and a gas line. On the right side of the working bench, it shows what it looks like from outside, specifically only a hand control

handle 1 and a sensor board 22 are observable from outside. On the left side, it shows how the apparatus is mounted. The apparatus is installed between a main gas line 23 and a sub-gas line 24 which connects to a gas burner 25. The valve box 21 is connected with the sensor board 22 through a relay 15. In FIG. 1B, the valve box 21 is amplified to show its exterior details. 13 is the solenoid of the electromagnetic valve of the apparatus.

[0027] Referring to FIG. 2, there is shown a perspective assembly view of the present invented apparatus structure as shown in FIG. 1B. Part description are following: the handle of the hand control switch 1; the hand control valve 2 ; screws 3; top cover of the valve box 4; gasket seal 5; main compartment 5; gasket ring 7 ; springs 8; gasket ring of the hand control switch 9; internal rod of electromagnetic valve (including gasket pad) 10; external shell of electromagnetic valve 11; gasket ring of the electromagnetic switch 12; solenoid 13.

[0028] Referring to FIG. 3, it illustrates the geometry of the valve box and demonstrates the working principle of the apparatus. When both valves are in close state, no gas could pass through the gas channel (Fig. 3A). Upon activation of the solenoid, it pulls the electromagnetic valve backward

to open the gas channel for gas passing through to a gas burner(FIG. 3B). Alternatively, one can switch on the hand control valve by turning the handle which will also allow gas passing through (FIG. 3C).

[0029] Referring to FIG. 4, there is shown a perspective assembly view of the electromagnetic valve as shown in FIG. 2.

[0030] Referring to FIG. 5, there is shown a perspective assembly view of the hand control unit as shown in FIG. 2.

[0031] Referring to FIG. 6A, there is shown an electrical circuit diagram used in the electromagnetic control unit of the disclosed apparatus. Reed switch, a kind of magnetic controllable switch, is used in the embodiment as the magnetic detecting device to monitor the presence of magnets. Upon activation of the sensor by magnets, relay (CR) will turn on the solenoid of the electromagnetic valve. As the result, the valve will open and let gas go through, as illustrated in FIG 3B.

[0032] A sensor board, shown in FIG.6B, contains at least one magnetic detecting device. Many kinds of magnetic detecting devices can be used in the invention, although one of the preferred magnetic detecting devices is a reed switch. In the preferred embodiment, a board 19 contains a number of reed switches 18. The board could be made



from many materials, although plastics is preferred. The reed switches 18 are either encased in the board 19 or attached to surface of the board 19. The mounting position of the sensor board is adjustable for operator's convenience and comfort.

[0033] A magnet band, shown in FIG.6C, is a band 17 with magnets 16. The band could be made from many materials, such as nylon. A person can wear the magnetic band anywhere, although knee is preferred.

[0034] In the preferred embodiment, the valve box 21 is sealed to prevent any gas leaky. The electric circuit of the magnetic control unit is also placed in a sealed box to prevent any potential sparks created by the electric circuit from leaky gas.

[0035] Of course the present invention is not intended to be restricted to any particular form or arrangement, or any specific embodiment, or any specific use, disclosed herein, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described of which the apparatus shown is intended only for illustration and disclosure of an operative embodiment and not to show all of the various forms or modifications

in which this invention might be embodied or operated.

[0036] The present invention has been described in considerable detail in order to comply with the patent laws by providing full public disclosure of at least one of its forms. However, such detailed description is not intended in any way to limit the broad features or principles of the present invention, or the scope of the patent to be granted. Therefore, the invention is to be limited only by the scope of the appended claims.